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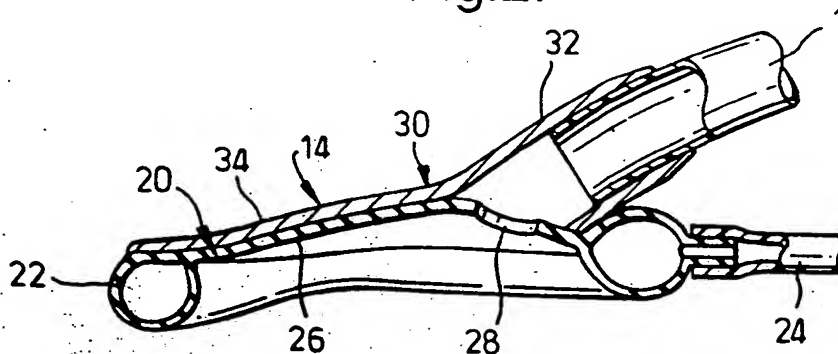
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## (54) Laryngeal mask airways

(57) A laryngeal mask assembly has a mask sub-assembly 14 at its patient end with an inflatable ring 22 and a diaphragm 26 extending within the ring. The mask subassembly 14 is attached to a tube 1 by means of a mount 30 comprising a backing plate 34 and a tubular

extension 32 fitted on the patient end of the tube. The diaphragm 26 is attached to the backing plate 34 and the plate overlaps the patient end of the sealing ring 22 extending close to the patient end of the assembly so as to inhibit rearward deflection of the patient end of the sealing ring.

Fig.2.



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## Description

This invention relates to laryngeal mask airways of the kind including a mask subassembly and an elongate tube opening at its patient end into the mask subassembly, the mask subassembly having an inflatable sealing ring located during use in the hypopharynx and opening on its forward side to the patient's airway.

It is common practice to use an airway known as a laryngeal mask for the administration of anaesthetic and ventilation gases to a patient. These airways comprise a tube with an inflatable mask or cuff at one end, the tube being inserted in the patient's mouth so that one end is located in the hypopharynx and so that the mask forms a seal in this region with the surrounding tissue. Laryngeal masks are described in, for example, US 5355879, US 5305743, US 5297547, US 5282464, GB 2267034, US 5249571, US 5241956, US 5303697, GB 2249959, GB 2111394, EP 446578, US 4995388, GB 2205499 and GB 2128561.

Laryngeal masks have several advantages over endotracheal tubes, which are longer and seal with the trachea below the vocal folds. One problem, however, with laryngeal masks is that insertion can cause trauma to the pharyngeal wall. This is because the tip of the mask has a tendency to stick in the pharynx as a result of the sharp turn it has to negotiate before it seats itself in the hypopharynx. These problems have been reported in, for example, *Anaesthesia* 1989; 44: 703 by van Heerden and Kirrage. Although the risk of damage can be reduced by ensuring that the head of the patient is correctly positioned during insertion, where the anaesthetist is not completely familiar with the correct technique, there is still an associated risk of trauma. Blood is often seen on the laryngeal mask when it is removed, even when the anaesthetist is experienced in the technique. The problem can be aggravated because, in conventional airways, when the mask is deflated for insertion, this causes the forward tip of the airway (as provided by the deflated leading edge of the mask) to curve in the opposite direction from the main tubular part of the airway. Because of this, the tip tends to curve rearwardly towards the hard palate, increasing the risk of trauma and morbidity. There can also be a risk, when the tip rubs during insertion, that the mask can evert and enter the nasal passage.

In GB 2259454 there is described an introducer for a laryngeal mask, which can be used to facilitate insertion and reduce the risk of injury to the patient. It is desirable, however, in some instances to avoid the need to use a separate introducer.

It is an object of the present invention to provide an improved laryngeal mask assembly.

According to the present invention there is provided a laryngeal mask assembly of the above-specified kind, characterised in that the mask subassembly has a generally planar backing member extending on the rear side of the mask subassembly to overlap the patient end of

the sealing ring such that, when the sealing ring is deflated for insertion, the backing member inhibits rearward deflection of the patient end of the sealing ring.

The mask subassembly preferably includes a mount member, the backing member being a part of the mount member and the mount member including a tubular extension attached with the elongate tube. The mask subassembly may include a mask portion, the sealing ring being a part of the mask portion, the mask portion including a diaphragm extending within the sealing ring and attached to the backing member, the diaphragm having an aperture therethrough opening into the tube. The backing member preferably extends close to the patient end of the assembly.

A laryngeal mask assembly according to the present invention, will now be described, by way of example, with reference to the accompanying drawings, in which:

- Figure 1 is a side elevation view of the assembly;
- Figure 2 is an enlarged sectional side elevation view of the mask subassembly;
- Figure 3 is a view from above of the rear of the mask subassembly;
- Figure 4 is a sectional side elevation view of the mask subassembly before assembly; and
- Figure 5 is a sectional side elevation view of a mask subassembly of a conventional, prior art assembly.

The assembly comprises a bendable tube 1 of a plastics material, such as PVC, with a coupling 10 at its machine end 12. The tube 1 is curved along its length and is joined at its patient end to a mask subassembly 14 comprising a mask portion 20 and a mount 30.

The mask portion 20 is similar to that described in GB 2111394, being formed of a soft, flexible plastics or rubber material. The mask portion 20 has a peripheral annular sealing ring 22 connected with an inflation line 24 by which the ring can be inflated and deflated with air. The sealing ring 22 is of elliptical shape with its major axis extending in the same plane as the tube 1. Within the ring 22, the mask portion has a flexible diaphragm 26 with a shallow conical shape. An opening 28 in the diaphragm 26 communicates with the bore through the tube 1. In its natural state, before the mask portion 20 is attached to the mount 30, the diaphragm 26 is attached with the sealing ring 22 at a midpoint around its thickness, in the conventional manner, as shown in Figure 4.

The mask portion 20 is attached with the patient end of the tube 1 by means of the mount 30 made of the same material as the mask portion itself. The mount 30 comprises a short tubular extension 32 extending a short dis-

tance along the outside of the machine end of the tube 1 and sealed with it by means of welding, solvent or an adhesive. The patient end of the tubular extension 32 is aligned with the opening 28 in the diaphragm 26. The mount 30 is completed by a backing plate 34 formed integrally with the tubular extension 32. The backing plate 34 is of generally elliptical shape and extends forwardly from the patient end of the tubular extension. The lower, forward side of the backing plate 34 is secured to the upper, rear surface of the diaphragm 26 and overlaps the sealing ring 22 so that the diaphragm is pulled up and the patient end of the sealing ring is twisted anticlockwise (as viewed in Figure 2). This causes the lower surface of the patient end of the mask portion 20 to bend down or forwardly. When assembled, the peripheral edge of the diaphragm 26 at the patient end side of the sealing ring 22 is contiguous with the upper, rear face of the ring so that the ring and diaphragm form a smooth continuation where they meet over the tip region. The backing plate 34 extends to within a few millimetres of the patient end of the assembly and is smoothly rounded so as to reduce the risk of trauma.

In previous laryngeal mask assemblies, as shown in Figure 5, the backing plate 34' does not overlap the sealing ring 22', so the sealing ring projects above the backing plate at its patient end. When air is pulled out of the sealing ring of these conventional assemblies, the sealing ring collapses and tends to bend upwardly or rearwardly at its patient end. Because the sealing ring 22' is substantially rigid when collapsed, this rearwardly-projecting tip can increase the risk of trauma to the hard palate during insertion.

In the present assembly, the patient end of the sealing ring 22 cannot project rearwardly when deflated, because the backing plate 34 extends over the sealing ring in this region. In this way, the rear surface of the mask subassembly 14 remains substantially flat during insertion. This reduces the risk of trauma, makes insertion easier and reduces the risk of the patient end being incorrectly inserted in the nasal passage. Because of this, the need to use an introducer is reduced.

#### Claims.

1. A laryngeal mask assembly including a mask subassembly (14) and an elongate tube (1) opening at its patient end into the mask subassembly, the mask subassembly (14) having an inflatable sealing ring (22) located during use in the hypopharynx and opening on its forward side to the patient's airway, characterised in that the mask subassembly (14) has a generally planar backing member (34) extending on the rear side of the mask subassembly to overlap the patient end of the sealing ring (22) such that, when the sealing ring (22) is deflated for insertion, the backing member (34) inhibits rearward deflection of the patient end of the sealing ring.
2. A laryngeal mask assembly according to Claim 1, characterised in that the mask subassembly (14) includes a mount member (30), that the backing member (34) is a part of the mount member (30), and that the mount member includes a tubular extension (32) attached with the elongate tube (1).
3. A laryngeal mask assembly according to Claim 1 or 2, characterised in that the mask subassembly (14) includes a mask portion (20), that the sealing ring (22) is a part of the mask portion, that the mask portion (20) includes a diaphragm (26) extending within the sealing ring (22) and attached to the backing member (34), and that the diaphragm (26) has an aperture (28) therethrough opening into the tube (1).
4. A laryngeal mask assembly according to any one of the preceding claims, characterised in that the backing member (34) extends close to the patient end of the assembly.

Fig.1.

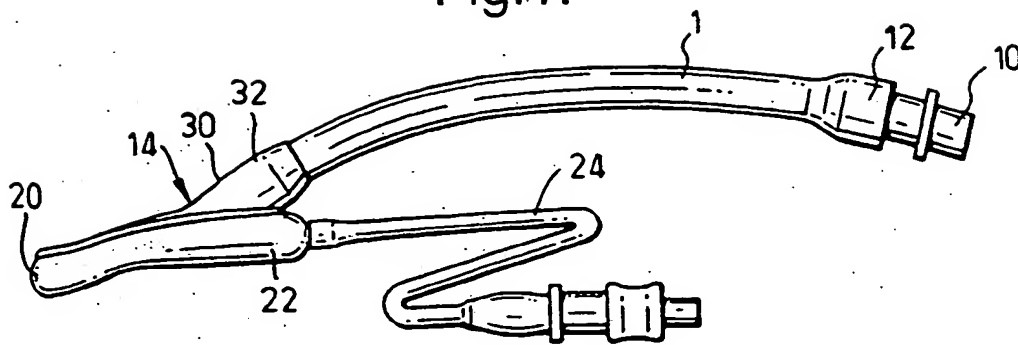


Fig.2.

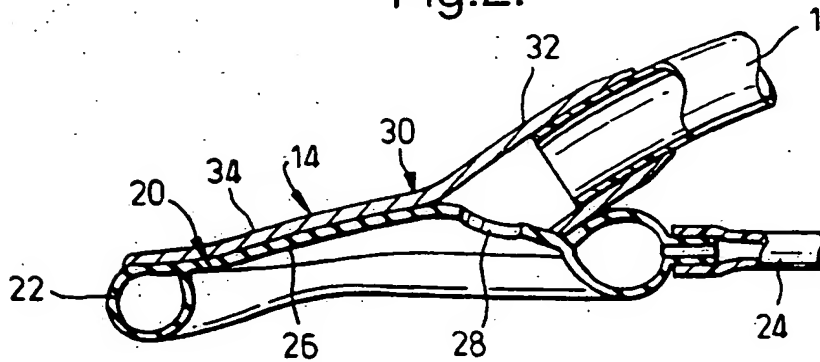


Fig.3.

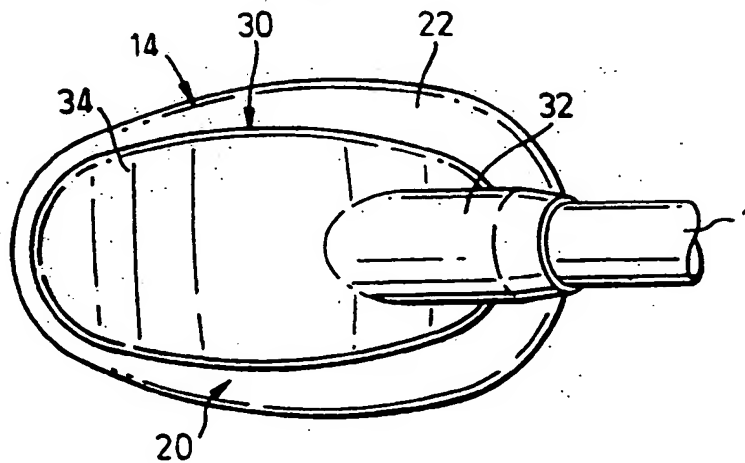


Fig.4.

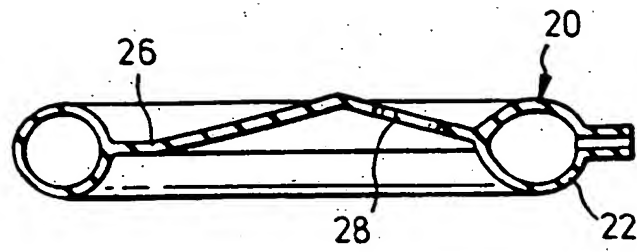
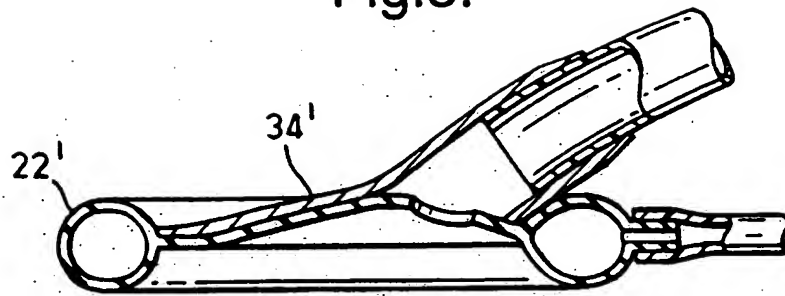


Fig.5.



PRIOR ART

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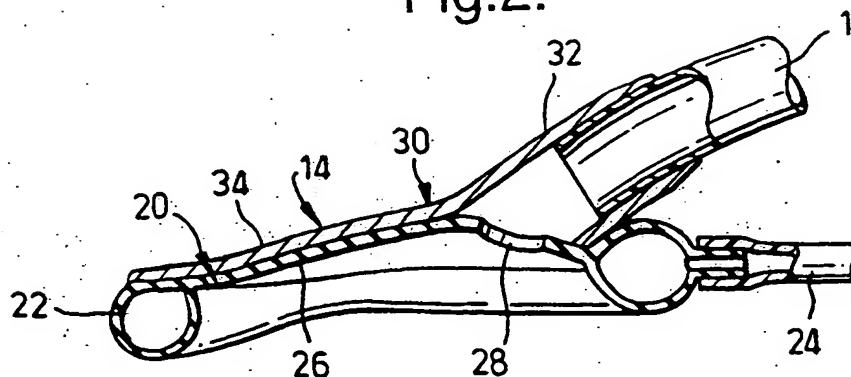
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Fig.2.



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## EUROPEAN SEARCH REPORT

Application Number  
EP 96 30 1132

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	EP-A-0 389 272 (BRAIN ARCHIBALD IAN JEREMY) 26 September 1990 * abstract; figures 7,9,10 * * column 5, line 13 - line 31 * * column 7, line 44 - line 58 * * column 8, line 25 - line 35 * ---	1-4	A61M16/04
A, P	US-A-5 477 851 (CALLAGHAN ERIC B ET AL) 26 December 1995 * abstract; figures * -----	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			A61M
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 6 November 1996	Examiner Zeinstra, H
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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